REMARKS

Claims 1-7 remain herein.

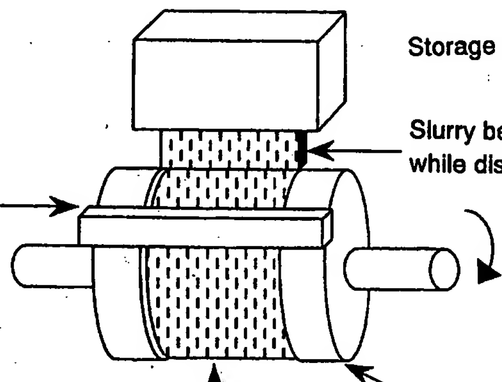
1. Claims 1-7 were rejected under 35 U.S.C. 112, first paragraph, as allegedly based upon an unenabling disclosure.

This issue has been addressed more than once in the prosecution history of this application. Applicant's attorneys sense the Examiner would like to see an actual description of how the outer coating can be applied. Applicant's response will be in two parts. Part A describes a coating technique to actually coat the honeycomb. Part B formally responds to the rejection.

Part A - Illustration of an actual coating technique to apply a coating

One of the coating methods is shown in the Figure copied on the next page.

Figure for Illustration Purposes



The Figure illustrates a slurry containing materials having the same composition as those for the honeycomb structure, being applied to the outer circumferential portion of the honeycomb structure. This forms the outer circumferential wall portion of the honeycomb structure. A viscosity of the slurry is almost equal to that of a dough for sponge cake; thus the slurry is supplied gradually from the tank storing the slurry just above to the honeycomb structure. During the supply of slurry, the disk that holds the structure is rotated. A knife provided in the position shown in the Figure removes the excess supplied slurry. Pores of the honeycomb structure easily adsorb a liquid portion of the supplied slurry so the viscosity of the supplied slurry becomes high. Thus, the slurry supplied does not run off the

coated position. This "curtain coating" or "flow coating" technique is a well-known coating method in the coating art. The coating artisan would easily appreciate that it could be used to apply the coating layer to the outer circumferential portion.

Part B - Applicant's Response to the Rejection

The rejection raises two points:

1. "The disclosure contains no description on how a slurry 'is applied.' Hence, one skilled in the art would not be appraised on how to make the invention."

2. "[A]ny slurry that is adhered to a ceramic body will create the claimed invention." This point will be addressed in the discussion of the rejection in Section 2.

For the first point, applicant makes two comments:

A. The specification is enabling.

Two embodiments are disclosed of how the slurry is applied to the outer periphery of the extruded honeycomb.

1st Embodiment - Fig 1(b)

The first way is to apply additional material to the outer periphery of an already-extruded honeycomb as illustrated in Fig. 1(b), copied below. This technique is described at page 12, line 16 to page 13, line 3, of applicant's specification; the extruded thickness of the

outer circumferential wall portion is about 0.25 mm. The same raw material is then slurried and applied on the outer circumferential wall portion as shown in Figs. 1(a) and 1(b) to provide an outer wall thickness of about 1.25 mm. The data in Table 2 show the superior results obtained.

FIG.1(b)

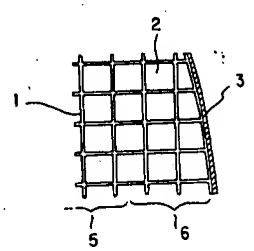
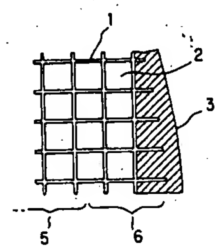


FIG.2(b)



<u>2nd Embodiment - Fig. 2(b)</u>

The second technique is to grind off part of the outer region of an extruded honeycomb and then apply additional material to the remaining outer periphery as illustrated in Fig. 2(b), copied above. This technique is described at page 19, line 1, to the end of page 20 of applicant's specification. A grinder is used to grind down the outer diameter from 118 mm to 105 mm. Then, the same raw material is slurried and applied on the ground-down outer circumferential wall portion (see Figs. 2(a) and 2(b)) to provide an outer diameter of about 106 mm. The pertinent

data appears in Table 4, and Table 5 reports the superior results obtained.

Figs. 1 and 2 are also described in Paragraphs [0016] to [0019] on pages 6-8 of applicant's specification.

Addressing the initial question of how the slurry "is applied," artisans in the coating art already know readily and easily how to apply a slurry. Paint, for example, is a slurry of pigment in a liquid suspension vehicle. Coating artisans know how to apply paint to a surface. Applicant's description of applying the slurry is sufficient without more to appraise the coating artisan how to apply the slurry to the normally cylindrical honeycomb outer surface to make the coating.

B. Artisans know how to apply a coating to the outside of a honeycomb article.

1. Kotani et al. '067

Kotani et al. '067 col. 8, lines 20-30, discloses various ways to apply coating material to the outer periphery of a honeycomb body 14; see Fig. 3.

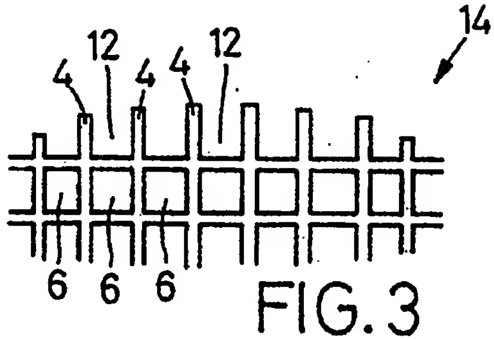


FIG.3

These disclosed coating techniques are brush coating, dipping, spray coating, flow coating or slushing. See the illustration of the flow coating process in Part A above. This disclosure again establishes that artisans know how to apply a coating to a honeycomb. Page 6 of the Office Action alleges that applicant does not teach how he coats the outer surface. However, applicant's specification in view of the knowledge of the prior art demonstrates that the artisans know how to do so. Thus, applicant has complied with the first paragraph of 35 USC 112.

MPEP 2164.05(a) regarding specification enablement states:

> 35 U.S.C. 112 requires the specification to be enabling only to a person "skilled in the art to which it pertains, or with which it is most nearly connected." In general, the pertinent art should be defined in terms of the problem to be solved rather than in terms of the technology area, industry, trade, etc. for which the invention is used.

> The specification need not disclose what is well-known to those skilled in the art and preferably omits that which is well-known to those skilled and already available to the public. (citing cases; emphasis added here)

Coating a ceramic cylinder outer surface with a slurry coating as in the present invention is a coating process well-known in the coating art.

According, recommendation and withdrawal of this rejection are respectfully requested.

2. Applicant understands the foregoing enablement rejection to relate to how to apply slurry to the outer circumferential layer. The explanation for this is given above in Section 1. There is also a slurry applied internally to the honeycomb in Comparative Examples 6-10, and the following additional explanation of how this is done is provided for the record.

If one assumes that the honeycomb structure has a diameter of about 106 mm, and that the outer circumferential portion thereof is an area having a width of about 15 mm from the extremes thereof, then the intermediate portion thereof is an area having a width of about 15 mm from the boundary line of the outer circumferential portion, and the intermediate portion and the center portion is the remaining area.

When the honeycomb structures in these comparative examples are internally slurry coated, first the portion having a distance of 0 to 46 mm from the center is covered with an adhesive tape having a diameter of 46 mm. Then, the thus prepared structure is dipped into slurry to make the slurry pass the through channels inclusive of the wall portions defining the channels located at an uncovered portion having the distance of 0 to 30 mm from the extreme of the outer circumferential portion. Thereafter, the portion having a distance of 0 to 76 mm from the center is covered with an adhesive tape having a diameter of 76 (30 + 46). Then, the thus prepared structure is dipped into the slurry to make the slurry pass through the channels inclusive of the wall portions defining the channels located at an uncovered portion having the distance of 0 to 15 mm from the extreme of the outer circumferential portion.

Applicant also wishes to note how the compression applied to the inside partition wall portion from the outer circumferential wall on cooling from the firing temperature can be measured. The specification states how the differences in thermal expansion coefficients between the different parts of the honeycomb structure can be determined. This is explained at page 15, lines 16-21. The different parts are cut from the honeycomb structure, and the coefficient of thermal expansion is directly measured.

Any artisan would immediately see how this technique for the determination of thermal expansion coefficients can be adapted to measure directly the strain in the outer circumferential wall and thereby determine that the inside partition wall portion is stressed. Before cutting the honeycomb in the test for thermal expansion coefficient the artisan would attach strain gauges to the outside of the outer circumferential wall. Once the cutting is completed, any hoop stress in the outer circumferential wall would be removed because the portion of the wall cut out would be able to relax. This relaxation would be detected by the strain gauges, informing the artisan of the level of stress in the outer circumferential wall before cutting.

Of course, if the outer circumferential wall of the structure is providing radial compressive stress, then the inside partition wall portion must be in compression, as required by claim 1. Consequently, determination of the stress in the outer circumferential wall by experiment confirms the presence or absence of compression in the inside partition wall portion.

3. Claims 1, 2 and 4-6 were rejected under 35 U.S.C. 102(b) over Kotani et al. '067.

In the Amendment filed December 31, 2003, claim 1 was amended to recite that "the outer circumferential wall portion has been made of a crystalline cordierite." This limitation clearly distinguishes applicant's invention from Kotani et al.

In the present invention the coated material in the outer circumferential wall portion is converted into a crystalline cordierite by firing it. See the description in Paragraphs [0020] to [0022] of the present specification. This formation of the united crystalline portion works as a member giving the compression effect (stress), as discussed in Paragraph [0023] of the present specification. Such a structure is not taught by Kotani et al. '067.

The outer coating of the Kotani et al. is either

(a) cordierite particles and a matrix of an amorphous oxide as a bonding agent, or

(b) ceramic fibers and a matrix of an amorphous oxide as a bonding agent (col. 7, lines 52-55).

The matrix of amorphous oxide is preferably formed by using colloidal silica or colloidal alumina as the inorganic binder (col. 7, lines 55-58). It is evident that the outer coating ingredients with their amorphous oxides do not become crystalline even when subjecting them to firing after coating, and thus the materials disclosed by Kotani et al. can not be converted into a crystalline cordierite. Thus the structure of the outer circumferential wall portion of the present invention is completely different from that of Kotani et al.

Kotani et al. '067 discloses a three-step honeycomb manufacturing process; see Example 1 at cols. 8-10. In a first

step, a honeycomb is made with an outer wall; see Figs. 1 and 2. The outer wall is ground away in a second step, and the absence of the outer wall is apparent in Fig. 3 copied below.

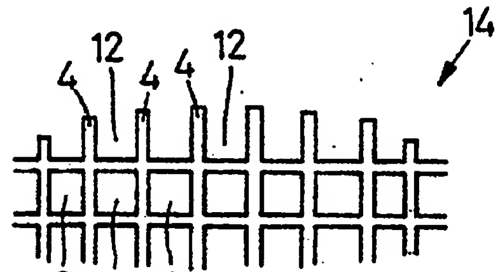


FIG.3

To permit grinding of the outer wall, the honeycomb first must have been fired to give to the partition walls 4 the structural rigidity needed to withstand the grinding process.

Finally, in a third step, additional cordierite material 16 is applied to make the thicker outer wall as seen in Fig. 4, copied below.

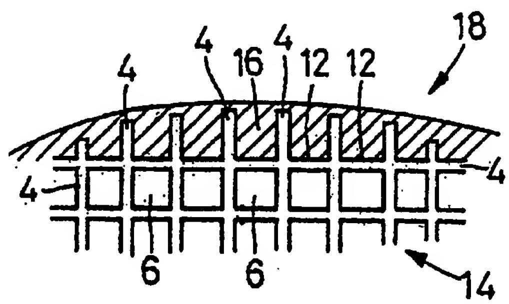


FIG.4

At page 2 of the Declaration filed July 18, 2003, honeycombs made by the method of Kotani et al. '067 are discussed. The TEC

values appear in Table 1. The two sample values for the honeycomb are:

	Positioned determined	TEC
Honeycomb body	Outer	1.55, 1.63
	Intermediate	0.50, 0.52
	Central	0.49, 0.53
Catalyst	Outer	1.85, 1.93
	Intermediate	1.10, 1.15
	Central	1.14, 1.17

The Declarant states (see the second and third paragraphs on page 6):

> In case of the present invention and Kotani, there was observed a big difference in the thermal expansion coefficient between the central portion and the circumferential wall portion.
>
> However, the declarant has realized that the stress can be given from the outer circumferential wall portion to the central portion only in the case that the shrinkage due to the temperature change of the product itself after firing occurs. Thus, in the case of the honeycomb structures obtained according to the method disclosed by Kotani, there is no room of giving substantial stress to the inner portion from the outer circumferential wall portion since the inner portion has been fired and become hard before the outer circumferential wall portion is coated after removing the distorted cells in the outer peripheral portions.

In other words, when the outer coating is applied in Kotani et al. '067 and fired, no additional stress will occur on the already fired inner portion of the honeycomb. Thus Kotani et al.

'067 will <u>not</u> be applying stress to the inside partition wall portion from the outer wall portion as required in the honeycomb structure in claim 1.

The Office Action contends that the products of Kotani et al. '067 and applicant have the same structure and characteristics. However, the outer coating on the Kotani et al. '067 article should be <u>amorphous</u> because the article contains a matrix of amorphous oxide such as colloidal silica and colloidal alumina, as recited, for example, in Kotani '067 claim 1. It is evident that this type of the material does <u>not</u> become crystalline, even when subjecting it to firing after coating.

On the other hand, the presently claimed outer circumferential wall portion should be made of a crystalline cordierite, as can be easily seen from the description on Paragraphs [0020] to [0022] of the present specification. Claim 1 recites "the outer circumferential wall portion having been made of a <u>crystalline</u> cordierite." This formation of the outer crystalline portion works as a member giving the compression effect (stress), as discussed in Paragraph [0023] of the present specification. Such a structure is <u>not</u> taught by Kotani et al. '067.

3a. Regarding claim 2, the Office Action contends Kotani further teaches a honeycomb structure body where the outer wall portion of the structure and the structure can be the same

(corderite) or different (cordierite and ceramic fibers) material (see col. 3, line 40-col. 4, lines 25). However, because claim 2 depends from claim 1, claim 2 is also patentable because Kotani et al. '067 fails to teach the basic honeycomb structure of claim 1. The rejection should be withdrawn.

3b. Regarding claim 6, the Office Action contends that col. 2, lines 38+ of the reference, describes that an open frontal area of 86% or more is shown in Figure 1. However, because claim 6 depends from claim 1, claim 6 is also patentable because Kotani et al. '067 fails to teach the basic honeycomb structure of claim 1. The rejection should be withdrawn.

4. Claim 7 was rejected under 35 U.S.C. 103(a) over Kotani et al. '067.

Because claim 7 depends from claim 1, claim 7 is also patentable because Kotani et al. '067 fails to teach the basic honeycomb structure of claim 1 as discussed in Section 3. The rejection should be withdrawn.

5. Claim 3 was rejected under 35 U.S.C. 103(a) over Kotani et al.'067 in view of Beauseigneur et al. '722.

The deficiencies of Kotani et al. '067 have been discussed in Section 3.

Beauseigneur et al. '722 is cited to show several examples of honeycomb structures having the wall thickness requirements recited in claim 3. However, because Beauseigneur et al. '722 provides (1) no teaching or suggestion that the thermal expansion coefficient, when measured in the diameter direction, of the outer circumferential wall is greater than the coefficient of the inside partition wall portion; (2) no teaching of having a crystalline cordierite for the outer circumferential wall portion; and (3) no teaching of applying a stress to the inside wall portion from the other circumferential wall, Beauseigneur et al. '722 cannot and does not overcome the deficiencies of Kotani et al. '067.

Accordingly, there can be no proper combination of these two references to deny patentability to claim 3. Reconsideration and withdrawal of this rejection are respectfully requested.

Should the Examiner deem that any further action by applicant would be desirable for placing this application in even better condition for issue, the Examiner is requested to telephone applicant's attorney at the number listed below.

Respectfully submitted,

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July 21, 2004
Date

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